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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/686,342	10/14/2003	Randal W. Chance	MI22-2387	7186

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EXAMINER
ROSASCO, STEPHEN D

ART UNIT	PAPER NUMBER
1756	

DATE MAILED: 08/05/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/686,342	CHANCE ET AL.	
	Examiner	Art Unit	
	Stephen Rosasco	1756	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *13 February 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-51* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-51* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *14 October 2003* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *1/23/04*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

Detailed Action

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 1-51 are rejected under 35 U.S.C. 103(a) as being unpatentable over Pierrat et al. (6,162,568) or Pierrrat et al. (6,558,854) in view of Nakagawa (5,276,551).

The claimed invention is directed to a method of converting a reticle from a first configuration suitable for a shorter wavelength of radiation to a second configuration suitable for a longer wavelength of radiation, comprising: providing the reticle in the first configuration suitable for the shorter wavelength of radiation, the first configuration reticle comprising a substrate material and a patterned material over the substrate material, the patterned material overlapping first regions of the substrate material and not overlapping second regions of the substrate material, the patterned material having a lower absolute transmission of the shorter wavelength of radiation than the substrate material, the shorter wavelength of radiation being shifted substantially out of phase upon passing through the combined thicknesses of the patterned material and first regions of the substrate material relative to passing through the thickness of the second regions of the substrate material; and while protecting the first regions of the substrate with at least the patterned material, reducing the thickness of the second regions of the substrate material; after the reduction in thickness, the longer wavelength of radiation being shifted substantially out of phase upon passing through the combined thicknesses of the patterned

material and first regions of the substrate material relative to passing through the thickness of the second regions of the substrate.

FIG. 9 shows construction 100 after the construction has been exposed to an etch which reduces a thickness of second portions 104 of substrate 12. If the exposed surface of substrate 12 comprises, consists essentially of, or consists of quartz, a suitable etch can be a dry etch utilizing, for example, C2F6. The quartz etch can be a timed etch, with a typical time for an exemplary application in which about 600 ANG of quartz is removed being from about 74 seconds to about 77 seconds.

An advantage of leaving chromium-containing layer 16 over material 14 during the etch of substrate 12 is that is frequently easier to selectively etch the material of substrate 12 relative to chromium-containing material 16 than it would be to selectively etch the material of substrate 12 relative to masking material 14. In the shown aspect of the invention, the substrate 12 has about the same thickness in first regions 102 relative to second regions 104 prior to the etch, and after the etch has significantly different thicknesses in first regions 102 relative to second regions 104. Substrate 12 will commonly have a thickness of about 250 mils (0.250 inches), and the etch of second regions 104 will frequently reduce a thickness of such second regions by about 600 ANG in applications in which construction 100 is initially configured for utilization with 193 nanometer wavelength radiation and is to be converted to a configuration suitable for utilization with 248 nanometer wavelength radiation.

The first regions 102 of substrate 12 can be considered to be protected with at least patterned material 14 during the etch which reduced the thickness of second regions 104 of

substrate 12, and in the shown embodiment are protected by both chrome-containing layer 16 and patterned material 14.

Pierrat et al. '854 teach a method of forming features on a semiconductor wafer comprising, projecting an optical image through a phase shifting mask using a light source selected from the group consisting of a first light source and a second light source wherein light from both the first light source and the second light source is phase shifted about 180 degree as it passes through a phase shifting layer on said mask.

And wherein said first light source has a wavelength of about 365 nm and said second light source has a wavelength of about 248 nm.

Pierrat et al. '568 teach a method of forming features on a semiconductor wafer comprising, projecting an optical image through a phase shifting mask onto a semiconductor wafer, said mask formed from a quartz substrate having a surface including a phase shifting layer which shifts a first exposure light having a wavelength of about 365 nm about 180 degree and which shifts a second exposure light having a wavelength of about 248 nm about 180 degree.

wherein said phase shifting layer is etched into said surface.

wherein said phase shifting layer is added to said surface.

The teachings of Pierrat et al. differ from those of the applicant in that the applicant teaches modifying the mask substrate designed to phase shift light of a shorter wavelength to one that is able to phase shift light of a longer wavelength.

Nakagawa teaches a reticle for lithography to form a fine pattern image on an object by irradiating light through the reticle, comprising: a transparent substrate;

a shield layer being made of a material that prevents transmission of the light and being selectively patterned and positioned on said substrate;

a first phase-shifter adjacent to said shield layer and selectively patterned in said substrate so as to define a first groove in said substrate, said first groove having a depth sufficient to produce a first phase difference between the light passing through both the first groove and first remaining substrate and the light passing through substrate areas without phase-shifters; and

a second phase-shifter adjacent to said shield layer and selectively patterned within said first groove so as to define a second groove, said second groove having a depth sufficient to produce a second phase difference between the light passing through both the second groove and second remaining substrate and the light passing through the first groove and the first remaining substrate, wherein said first and second phase differences are substantially equal to a half wavelength of said light and wherein said shield layer, said first phase-shifter and said second phase-shifter are selectively patterned to define the fine pattern image during irradiation by the light.

And wherein said first phase-shifter includes a defective portion, and wherein said depth of said groove of said second phase-shifter is sufficient to produce a phase-shift to correct said defective portion of said first phase-shifter.

And wherein said phase-shift is substantially equal to one full wavelength of said light.

It would have been obvious to one having ordinary skill in the art to take the teachings of Pierrrat et al. '568 or '854 and combine them with the teachings of Nakagawa in order to make the claimed invention because the adjustment of depth of a shifter and its

relationship to wavelength of light to be shifted are all well known, the use of a mask to shift different wavelengths of light the same amount is also taught and adjusting the depth of a shifter on a mask to change the shift of the incident light is also taught, the applicant is adjusting the mask for a different reason which is to produce a shifting of a longer wavelength, however the teachings with respect to the mask are the same.

Conclusion

Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Stephen Rosasco whose telephone number is (571) 272-1389. The Examiner can normally be reached Monday-Friday, from 8:00 AM to 4:30 PM. The Examiner's supervisor, Mark Huff, can be reached on (571) 272-1385. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

S. Rosasco
Primary Examiner
Art Unit 1756

S.Rosasco
07/29/05